

New records of nudibranchs (Mollusca: Gastropoda) from Bahia State, northeastern Brazil

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ABSTRACT: Although around 3,000 species of nudibranchs are known worldwide, only nearly 100 species are reported from Brazil. From Bahia State, northeastern Brazil, only seven species are listed. The current article provides four new records of nudibranchs from this region: *Geitodoris pusae* (Marcus 1955); *Felimida paulomarcioi* (Domínguez, García and Troncoso 2006); *Felimida binza* (Marcus and Marcus 1963) and *Cadlina rumia* Marcus 1955. The new records presented herein fill part of a historical gap in the species geographic distribution, and increase to eleven the number of nudibranch species known from Bahia.

Estimative of the richness of gastropod molluscs vary widely, from 40,000 to about 150,000 species worldwide (Wägele *et al.* 2008). In Brazil, the underestimated local diversity is evidenced by constantly publications of new records and descriptions of new species (e.g. Simone 2009; Lima *et al.* 2010; Padula and Delgado 2010; Alvim *et al.* 2011; Queiroz *et al.* 2011; Sales *et al.* 2011). The situation is more notable when one considers the marine shell-less group Nudibranchia. This group includes around 3,000 species worldwide. Nearly 100 of these species have been recorded in Brazil (DaCosta *et al.* 2010), but only seven species were recorded from Bahia State up to date (García García *et al.* 2008; Rios 2009; Sales *et al.* 2011).

Most records of nudibranchs known from Bahia resulted from isolated samplings as part of broader surveys (García García *et al.* 2008). Until recently, studies focused on nudibranchs in the coast of Bahia were practically nonexistent. Given this scenario, the authors conducted surveys in different regions of the coast of Bahia, with the objective to known better the biodiversity of nudibranchs in this region. As part of the results, one new record from South Atlantic Ocean was already reported (Sales *et al.* 2011). The present contribution includes four new records of nudibranchs from Bahia State, based on surveys

performed in the metropolitan beach of Pituba (Table 1). This beach (13°00'21.76"S; 38°27'12.52"W) (Figure 1) consists of a large area of rocky shore located near the mouth of Camurujipe River, in the metropolitan area of Salvador city (Alves and Cerqueira 2000). Local rocky bottoms and coastal reefs contribute for the occurrence of a high marine biodiversity (Villas-Bôas and Correia, unpublished data), although some areas are under pollution, including sewer outflow.

Samplings were conducted in tidal pools during spring low tides, looking for specimens under the rocks. The specimens were collected manually, photographed, cold-anesthetized and subsequently fixed and preserved in ethanol 70%. Material is deposited in the gastropod collection of the Museu de Zoologia da Universidade Federal da Bahia (UFBA).

The new records for Bahia State are: *Geitodoris pusae* (Marcus 1955) (Figure 2A), one specimen (UFBA 004; 20 mm long, alive); *Felimida paulomarcioi* (Domínguez, García and Troncoso 2006) (Figure 2B), one specimen (UFBA 003 - 18 mm long, alive); *Felimida binza* (Marcus and Marcus 1963) (Figure 2D), three specimens (UFBA 002 - 3 mm long, alive; UFBA 007 - 6 mm and 10 mm long, preserved) and *Cadlina rumia* Marcus 1955 (Figure 2C),

TABLE 1. Distribution of the species in Brazil and new records

TAXON	PRELIMINARY RECORDS IN BRAZIL	PRESENT RECORD IN BRAZIL
<i>Geitodoris pusae</i> (Marcus 1955)	São Paulo State (Marcus 1955; García García <i>et al.</i> 2008); Rio de Janeiro State (García García <i>et al.</i> 2008); Alagoas State (Padula <i>et al.</i> 2012).	Bahia State
<i>Felimida paulomarcioi</i> (Domínguez, García and Troncoso 2006)	Rio de Janeiro State (Domínguez <i>et al.</i> 2006; García García <i>et al.</i> 2008); Santa Catarina State (Padula <i>et al.</i> 2011); Alagoas State (Padula <i>et al.</i> 2012).	Bahia State
<i>Felimida binza</i> (Marcus and Marcus 1963)	São Paulo State and Rio de Janeiro State (García García <i>et al.</i> 2008); Alagoas State (Padula <i>et al.</i> 2012).	Bahia State
<i>Cadlina rumia</i> Marcus 1955	São Paulo State (Marcus 1955; García García <i>et al.</i> 2008); Rio de Janeiro State (García García <i>et al.</i> 2008); Alagoas State (Padula <i>et al.</i> 2012).	Bahia State

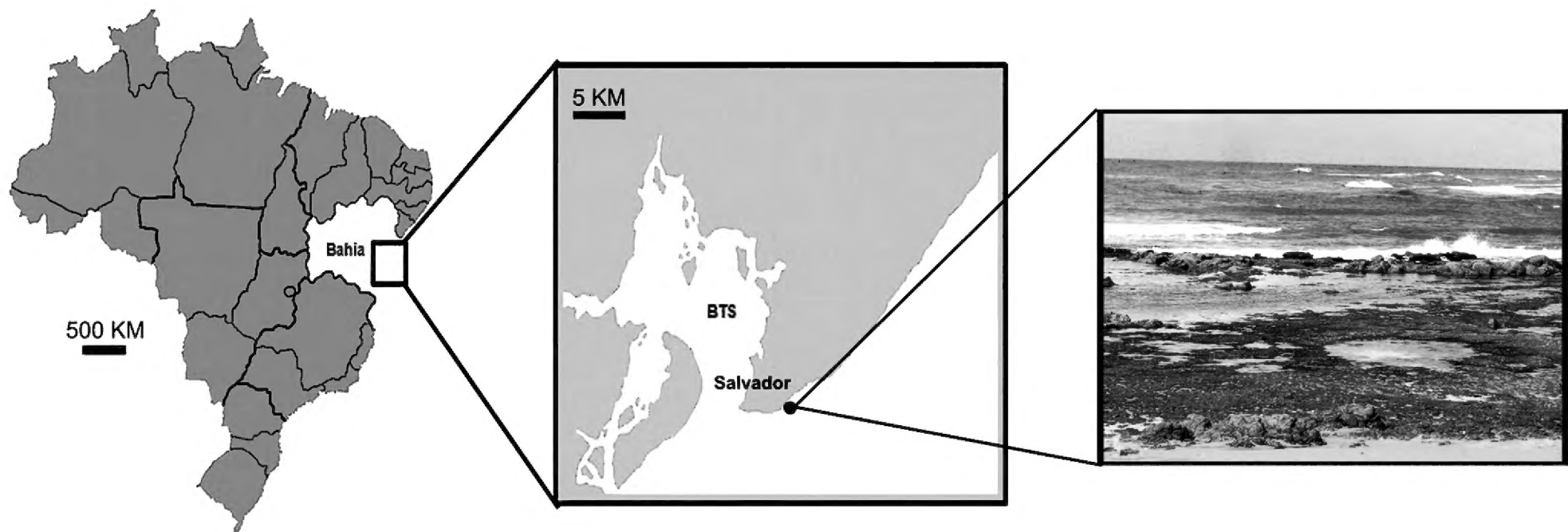


FIGURE 1. Sampling area. Pituba beach, Salvador city, Bahia State, northeastern Brazil.

four specimens (UFBA 005 - 5 mm and 12 mm long, alive; UFBA 006 - 10 mm and 15 mm long, alive). The specimens studied herein are consistent with species original descriptions (eg. Marcus 1955; Domínguez *et al.* 2006) and additional works (Ortea *et al.* 1988; Sánchez Tocino *et al.* 2006; Valdés *et al.* 2006; García García *et al.* 2008). Except for *F. paulomarcioi*, endemic from Brazil (but see Padula *et al.* 2011), the other three species have been, for a long time and in a recurrent pattern, previously recorded from Florida, through the Caribbean Sea and, after a wide geographical gap, in southeastern Brazil (García García *et al.* 2008; Rios 2009). More recently these species were recorded in Alagoas State (Padula *et al.* 2012) and just

one of them (*F. paulomarcioi*) in Santa Catarina State (Padula *et al.* 2011), in northeastern and southern Brazil, respectively.

In the biogeographic approach of García *et al.* (2006) on Brazilian opisthobranchs, the result of greater diversity in the zoogeographical zone that includes southeastern Brazil was clearly a result of a stronger sampling effort in this region. García *et al.* (2006) commented that future studies along the Brazilian coast are necessary to obtain a better understanding of the Brazilian nudibranch fauna and biogeography. The new records presented herein, as also the ones recently listed from Alagoas State (Padula *et al.* 2012), are efforts in this direction. Furthermore, with the present records, the number of nudibranchs known from Bahia State increases from seven (García García *et al.* 2008; Rios 2009; Sales *et al.* 2011) to eleven species. It is worth to mention that Pituba beach suffers the effects of pollution, being located in the metropolitan area of Salvador, which valorizes even more the records presented herein and points to a potentially rich, but still hidden, biodiversity of nudibranchs in Bahia State.

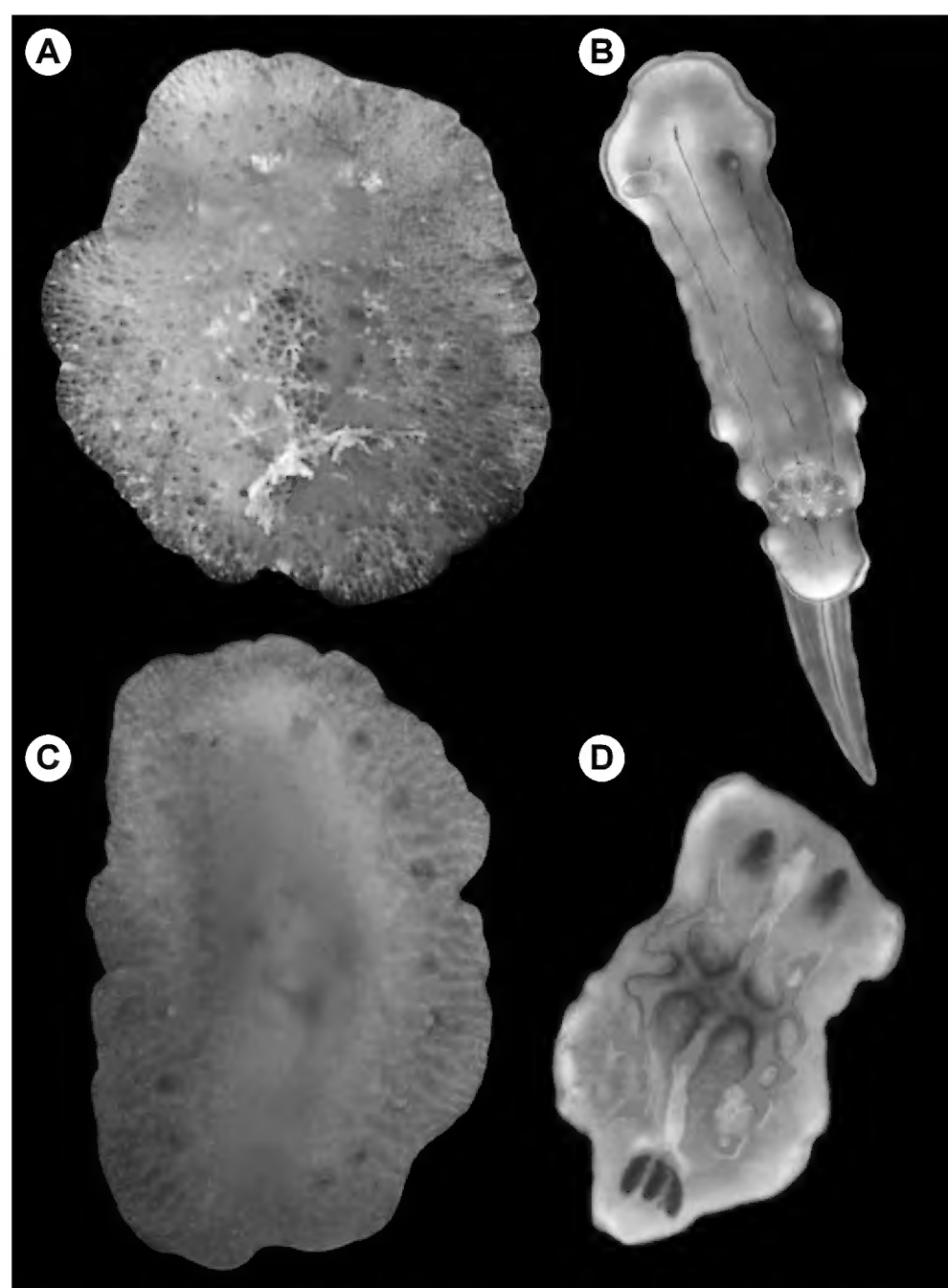


FIGURE 2. New records from Bahia State, northeastern Brazil: A. *Geitodoris pusae* (UFBA 004; 20 mm long); B. *Felimida paulomarcioi* (UFBA 003; 18 mm long); C. *Cadlina rumia* (UFBA 005; 12 mm long); D. *Felimida binza* (UFBA 002; 3 mm long, young specimen).

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LITERATURE CITED

- Alves, O.F.S. and W.R.P. Cerqueira. 2000. Echinodermata das praias de Salvador (Bahia, Brasil). *Revista Brasileira de Zoologia* 17(2): 543–553.
- Alvim J., V. Padula and A.D. Pimenta. 2011. First record of the genus *Onchidoris* (Gastropoda: Nudibranchia: Onchidorididae) from the South Atlantic Ocean, with the description of a new species from Brazil. *Journal of the Marine Biological Association of the United Kingdom* 91(2): 505–511.
- DaCosta S., V. Padula and M. Schrödl. 2010. A new species of *Hypselodoris* and a redescription of *Hypselodoris picta lajensis* (Nudibranchia: Chromodorididae) from Brazil. *The Veliger* 51(1): 15–25.
- Domínguez M., F.J. García and J.S. Troncoso. 2006. Some aspects of the family Chromodorididae (Opisthobranchia: Nudibranchia) from Brazil, with description of a new species. *Scientia Marina* 70: 621–634.
- García F.J., M. Domínguez and J.S. Troncoso. 2006. Biogeographic considerations of the Opisthobranchia (Mollusca: Gastropoda) fauna from the Brazilian littoral and nearby areas. *Bonner zoologische Beiträge* 55: 203–222.
- García García F.J., M. Domínguez Álvarez and J.S. Troncoso. 2008.

- Opisthobranchios de Brasil: Descripción y distribución de opisthobranchios del litoral de Brasil y del Archipiélago Fernando de Noronha*. Vigo: Feito, S.L. 215 p.
- Lima S.F.B., J.C.N. Barros and J.A. Francisco. 2010. A new deep-sea species of *Mitromorpha* (Gastropoda: Conoidea: Conidae) off Brazil. *Journal of the Marine Biological Association of the United Kingdom* 90(3): 599–603.
- Marcus Er. 1955. Opisthobranchia from Brazil. *Boletim da Faculdade de Filosofia, Ciências e Letras da Universidade de São Paulo, Zoologia* 20: 89–262.
- Ortea J., A.A. Luque and J. Templado. 1988. *Elysia picta* Verrill, 1901, and *Geitodoris pusae* (Marcus, 1955), two amphiatlantic opisthobranch gastropods. *Journal of Molluscan Studies* 54: 243–247.
- Padula V. and M. Delgado. 2010. A new species of *Cerberilla* (Gastropoda: Nudibranchia: Aeolidiidae) from northeastern Brazil. *The Nautilus* 124(4): 175–180.
- Padula V., J. Bahia, C. Vargas and A. Lindner. 2011. Mollusca, Nudibranchia: new records and southward range extensions in Santa Catarina, Southern Brazil. *Check List* 7(6): 806–808.
- Padula V., J. Bahia, M.D. Correia and H.H. Sovierzoski. 2012. New records of opisthobranchs (Mollusca: Gastropoda) from Alagoas, Northeastern Brazil. *Marine Biodiversity Records* 5(57): 1–11.
- Queiroz V., L. Sales, C.L.S. Sampaio, E.G. Neves and R. Johnsson. 2011. Gastropoda, Caenogastropoda, Eulimidae, *Annulobalcis aurisflamma* Simone and Martins, 1995: First record to northeastern Brazil. *Check List* 7(5): 645–647.
- Rios E.C. 2009. *Compendium of Brazilian Sea shells*. Rio Grande: Evangraf. 668 p.
- Sales L., M. Delgado, V. Queiroz, V. Padula, C.L.S. Sampaio and R. Johnsson. 2011. First record of *Flabellina dana* Millen and Hamann, 2006 (Mollusca: Nudibranchia) in the South Atlantic Ocean. *Check List* 7(6): 880–882.
- Sánchez Tocino L., A. Ocaña and J.L. Cervera. 2006. *Geitodoris pusae* (Marcus, 1955) y *Geitodoris bacalladoi* Ortea, 1999, dos especies de Doridoidea (Mollusca: Nudibranchia) nuevas para el Mar Mediterráneo. *Iberus* 24: 5–12.
- Simone L.R.L. 2009. New Gastropods from the São Pedro e São Paulo Archipelago, Brazil (Vetigastropoda and Caenogastropoda). *Strombus* 16(1-2): 11–18.
- Valdés, A., J. Hamann, D.W. Behrens and A. Dupont. 2006. *Caribbean Sea Slugs: A field guide to the the opisthobranch mollusks from the tropical northwestern Atlantic*. Washington: A Sea Challengers Natural History Books Publication. 289 p.
- Villas-Bôas C. and C.M.G. Correia (unpublished data). Projeto de Melhoria no Beneficiamento do Pescado na Associação de Pescadores da Pituba. *Programa de Bolsas BITEC 2008/09 – Bahia*.
- Wägele H., A. Klussmann-Kolb, V. Vonnemann and M. Medina. 2008. Heterobranchia I, The Opisthobranchia; p. 385–408 *In* W. Ponder and D.R. Lindberg (ed.). *Phylogeny and Evolution of the Mollusca*. California: California University Press.

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